

April 15, 1886.

Professor STOKES, D.C.L., President, in the Chair.

The Presents received were laid on the table, and thanks ordered for them.

The following Papers were read:—

- I. "Preliminary Notes on certain Zoological Observations made at Talisse Island, North Celebes." By SYDNEY J. HICKSON, D.Sc., B.A. Communicated by Professor H. N. MOSELEY, F.R.S.* Received March 25, 1886.

Notes upon an Alcyonarian (Clavularia viridis).

In one of my earliest walks upon the coral reefs of Talisse, I came across a spot where Tubipores and Cornularias were more abundant than elsewhere. Quantities of the little crowds of brownish-green or pure brown polypes of these Alcyonarians, with occasionally a crowd of the emerald-green polypes of a small species of Tubipora, were to be seen on every side. As I was wading along through the water on this spot, my stick accidentally struck against a mass of what I thought was Tubipora; but when the polypes had retracted I saw to my surprise that, instead of the usual bright red skeleton, there was a skeleton of a dirty green colour, the tubes of which were joined, not by platforms, but by tubes. Taking with me a large speci-

* [Note by Professor H. N. Moseley.—The Alcyonarian described here by Mr. Hickson is apparently identical with a specimen in the British Museum, collected by Mr. A. R. Wallace in the Aru Islands, and labelled *Clavularia viridis*. The existence of transverse communicating canals in Clavularia, extending between the vertical tubes at successive heights above the stolon tubes, as in *Syringopora*, is apparently a new fact, and one of great interest. The genus Clavularia has received considerable attention from modern naturalists. G. v. Koch has described the anatomy of *Clavularia prolifera*, and A. Kowalevsky and A. F. Marion the larval phases of *Clavularia petricola*; but these forms, together with most others included in the genus, appear to have the vertical tubes united only at the level of the stolon, as is the case, according to Mr. Hickson, in the young state of the form he describes. Possibly his form will require to be placed in a separate genus. The existence of rudimentary ampullæ in the cœnosteum of *Millepora* has been described by Mr. Quelch, of the British Museum, but the actual gonads of the Milleporidæ have hitherto remained undiscovered. The notes have been written by Mr. Hickson where he is of course unable to refer to scientific literature.]

men of it in sea-water, I examined it carefully at my house, and the next morning I procured some more, and treated it in various ways for microscopic examination.

There are one or two features in the anatomy of this Alcyonarian which throw a good deal of light not only upon the zoological position of Tubipora but also that of the extinct Syringopora.

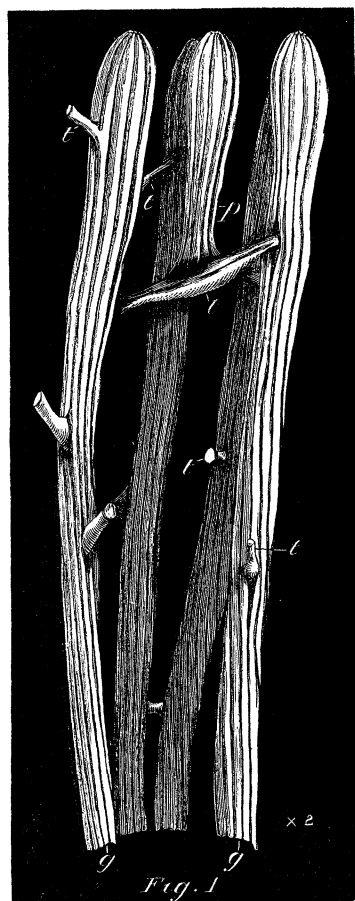
At present I have only found this form on the inside of the reef growing upon old and dead coral masses; in its neighbourhood are numerous specimens of Tubipora, some of them with unusually large tubes, two or three species of Cornularia, a few Madreporas, and one or two Astræids. It clings to the rocks by a stolon of tubes, which run in various directions and follow all the unevennesses of the supporting rock. It is very easy, however, to pull it away bodily, without injuring the stolon.

The polype tubes spring perpendicularly from the stolon, and rise to a height of 2 or 3 inches. I have not found any tubes longer than that at present, in fact the average is rather below that. It may be, however, as is the case with Tubipora, that the masses grow much larger and the tubes much longer in more favourable localities. The tubes are united together, not by platforms, as in Tubipora, but by simple tubes, as in Syringopora (fig. 1), and from these connecting tubes new polype tubes spring. Each polype tube is marked by eight grooves, corresponding with the eight mesenteries, and these grooves, instead of running straight from the stolon to the mouth, turn to the left, and run up the tubes spirally, plainly showing that in the course of the growth of the polype from the stolon or connecting tube it is twisted from left to right. Examining a portion of the dried skeleton, I found that it is not purely calcareous, as is the skeleton of Tubipora, but consists of a few long spicules imbedded in a coriaceous substance, which is unaffected by strong hydrochloric acid. I should not like to say for certain of what chemical nature this substance is, but from its microscopic appearance I should expect elastin. The tubes are not perforated as in Tubipora, and I cannot at present discover any organic connexion between the mesoderm outside the tube and the mesoderm inside the tube.

The polypes very closely resemble the polypes of Tubipora. They are of a rich brown colour, and contract but slowly when irritated. The tentacles have the usual Alcyonarian character, and are richly armed with nematocysts.

At this season of the year this Alcyonarian does not seem to breed at all, as after examining a great many polypes I have found none sexually mature. The young colonies, which are to be found in abundance on the reefs, closely resemble a species of Cornularia, which is found here in abundance, consisting simply of branched stolons, from which the young polypes spring.

FIG. 1.



Small portion of the skeleton ($\times 2$) as it appears when dry, showing the longitudinal grooves which correspond with the mesenteries (*gg*), the connecting tubes (*tt*), and a young polype springing from a connecting tube (*p*).

Histologically it does not seem to differ in any important particular from *Tubipora*, but I hope in a later and fuller paper to be able to give the results of a further and better investigation.

The importance and interest of this genus is two-fold. In the first place the structure of the stolon, the mode of connexion of the polype tubes, and the fact that its skeleton is imperforate, show that it is closely allied to the extinct genus *Syringopora*, which it resembles in all these particulars. Notwithstanding the mass of evidence which

has been brought by Moseley, Zittel, and others, to prove that this latter genus is Alcyonarian, there are still some authors who maintain that it is Zoantharian. The peculiar structure of the present form goes far to prove that the former opinion is right, and the latter wrong.

In the second place the resemblance of the young colonies of this form to the genus *Cornularia*, and the resemblance of the adult colonies and polypes to those of *Tubipora*, justify the conclusion I arrived at in a former paper, that *Tubipora* should be united with the *Cornularidæ* into a group, the *Stolonifera*; this genus is, in fact, the connecting link between these genera which was formerly missing, unless we assumed that *Syringopora* was undoubtedly Alcyonarian.

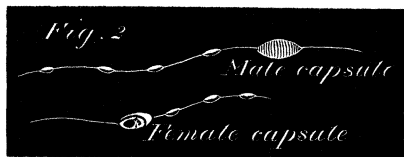
I hope in a future paper to be able to give some further particulars of the anatomy of this form, perhaps also some account of the early stages of its development, and some account of my researches upon the other *Stoloniferous Alcyonaria*, which are present here in abundance.

Note on Tubipora and on Millepora.

I have got the early stages of the development of *Tubipora*. It is regularly holoblastic, and I think the gastrula is formed by invagination. Finding, however, that it is very difficult to keep the embryos alive in this hot and dusty weather, I must wait until it becomes a little cooler in December before I can get any very satisfactory results on this latter point.

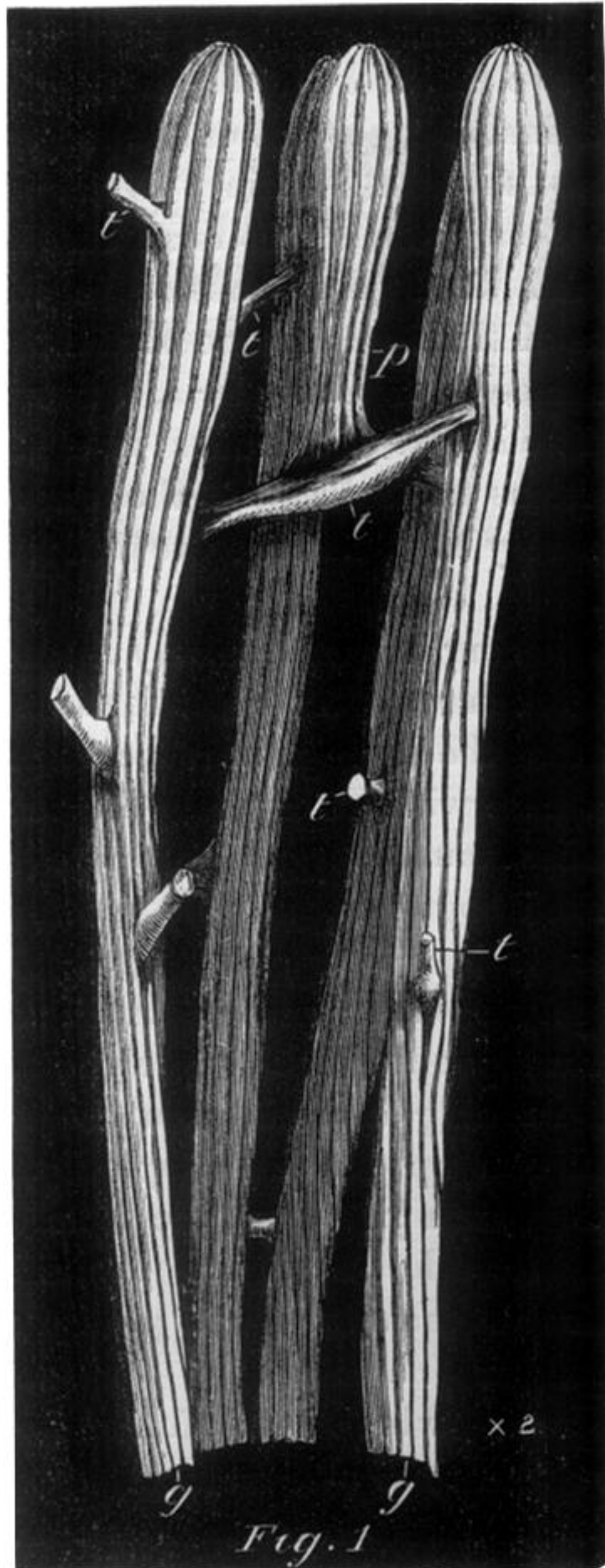
The generative products of *Millepora* are formed in little capsules in the walls of the canals, and I have found both male and female capsules in the same canals. The embryos, *I believe from the evidence of one preparation only*, reach a certain stage of development in chitinous capsules in the canals, and they are then discharged into the water by the mouths of the gastrozoids.

FIG. 2.



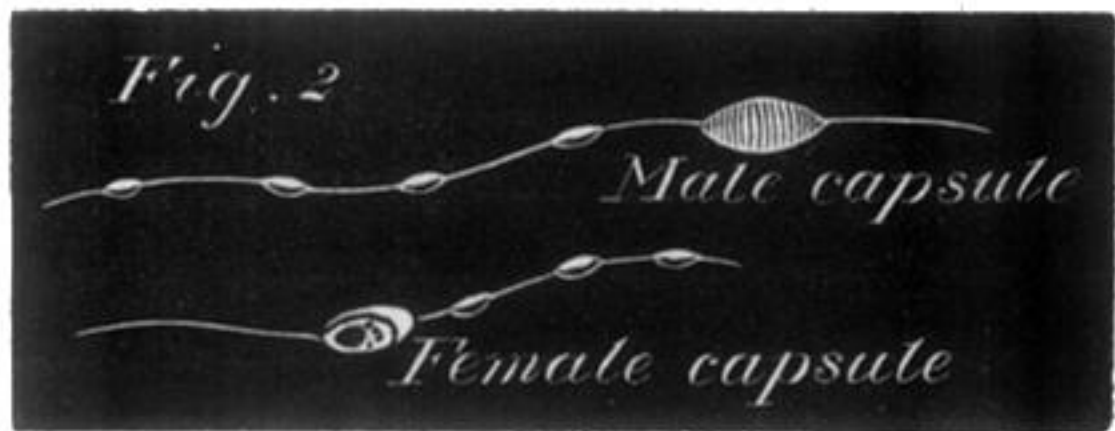
Generative capsules of *Millepora*.

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Generative capsules of *Millepora*.